

End user management concept

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Energy audit for end-users in apartment buildings: Design insights and Strategy

Design insights

A design strategy is being developed for the city of Gothenburg that builds on the Climate Agreement demonstrator. The strategy is to create an easy and inexpensive way to help building owners understand the inefficiency of the radiator system as well as the potential savings after optimization. This is typically done after a customer signs a Climate Agreement, however with a user-centered design, this process could be offered to all customers without the Climate Agreement as a sort of energy audit that could lead customers to sign a Climate Agreement. Outlined next are some design considerations for the strategy.

Technology

One of the limiting factors of temperature sensors is the requirement to have many sensors and that they all be connected wirelessly so as to collect real-time data and feed into some sort of feedback interface. This usually means it is a large investment both in cost and installation. However, for a temporary energy audit the real-time data and developed feedback system is not necessary, and in fact might be contrary to the goal. It might be more useful to focus on easy installation so that non-technical people can still conduct an energy audit. Because of this, the current strategy is to provide non-connected sensors that store the data locally so the installation is every easy.

For large buildings with many apartments, the cost for even cheap sensors can still be expensive overall because so many sensors are needed to get an adequate data collection. Since the Energy Audit concept intends to only measure the temperature temporarily, it should not be required that a building owner or manager make the investment to buy permanent sensors. To keep costs down the current strategy is to loan the sensors to the building for the use of the audit and then be returned so the sensors can be reused. Because the data is stored in the sensor, there is incentive for the borrowers of the sensors to return them in order to get the data.

Function

The current design intends to create a 2-week Energy Audit kit that contains the non-connected sensors and instructions for use. A customer can order the Energy Audit kit from the provider and a box with sensors will arrive in the mail. The instructions will tell the person how and where to install the sensors, which is as simple as taking the back off a sticker and placing on a wall. After two weeks the person will go back and collect the sensors, place them in the box, and mail back to the provider. Once the provider receives the sensors, they transfer the data to a developed system, which will analyze the collected temperature data to the data from the provider, including configurations from the DH central in the basement of the building. This can then give an estimate for how much could be saved if the radiator system was optimized. A report is generated and sent back to the customer with options for optimization and overview of the Climate Agreement.

It is important to note, that this data is not detailed. The goal is not to gather high-definition data and return a detailed report. This goal is more human centered than technology centered. It takes into consideration that many people do not know that their heating system could be optimized and more efficient. Ultimately the Climate Agreement will help fully optimize the entire building by considering more than just the radiator system, but this type of energy audit could help people realize the need for optimization and lead to a relationship with the provider to create a plan for how to do so.

Read more

CELSIUS Videos

- [CELSIUS Talk: IT solutions for demand side management](#)

Other

- [Survey of Radiator Temperatures in Buildings Supplied by District Heating](#), a Masters thesis by Maria Jangsten for Chalmers Technological University

References

- [Gothenburg case study](#)
- [Climate agreement in Gothenburg](#)
- [Energy matters in buildings: Individual and collective issues](#)

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